



SUN FIRE™ X2100, X4100 AND X4200 SERVERS **REDEFINING X64 INDUSTRY STANDARD SERVERS**

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Introduction

After the dot-com boom, IT executives were focused on aggressive cost-reduction while continuing to expand IT service offerings and deliver high quality services. In keeping with this goal, many IT teams turned to using x86 servers with the Linux operating system to run business-critical applications. Not only is the cost of acquiring these x86 servers a plus, but service availability can be cost-effectively scaled by deploying pools of redundant servers in a distributed architecture that supports rapid growth.

While distributed computing using x86 servers has many benefits, businesses still face a number of issues when aggregating a large number of these servers within their IT infrastructure.

- *Agile deployment*

Because IT services are at the heart of business functions such as customer service and new product development, agility in IT services can impact customer satisfaction, time to market, and other business metrics. The sheer number of components involved in a typical infrastructure creates complexity that can slow deployment and inflate the cost of daily operations. Businesses must be able to rapidly deploy new services and add capacity to IT services without disruption, delay, or added complexity.

- *Reducing the cost of IT operations*

Even when adding capacity to IT services, IT executives are challenged to continue driving down the cost of delivering and managing these services. Some hidden costs have emerged in operating distributed systems. The cost of managing a large number of servers as well as the cost of cooling and power for these servers is more of a burden than was first anticipated. And because it can be expensive to add cooling capacity to a building, IT service capacity can become an issue even when the data center still has room for more servers. In consideration of these factors, purchase decisions for IT infrastructure components must now be evaluated on a broader range of features and functions beyond price/performance. The ease with which a server or storage component can be managed and maintained within a large distributed system has become an important criteria for purchase decisions. A new criteria is also emerging as IT managers see the value of servers that are more energy efficient and able to contribute to reduced cost of power and cooling in the data center.

- *Greater return on IT assets*

Return on Assets (ROA) is impacted by both system performance and system utilization. Higher performance servers enable businesses to generate greater transaction or compute throughput per dollar. Faster response times for users can then translate to increased productivity and improved business results. System utilization can also impact ROA because fewer systems are needed when each system is more efficiently used and thus handles a bigger workload. For businesses that deploy hundreds or thousands of servers, small increases in performance throughput and system utilization can easily translate into many thousands of dollars in savings.

- *Enterprise reliability and security*

Service levels for business-critical applications must consistently exceed user expectations and enterprise data must be protected from security threats. Security must be built-in to the overall system design instead of being patched on after the fact. Systems must be designed for reliability through built-in redundancy and remote management features that can reduce the risk of unexpected service errors. Lastly, systems must be easy to maintain and repair. A failed component such as a system fan, for example, should not create a service interruption, and

should be easily replaceable at a conveniently scheduled service time. In short, today's enterprise systems must be highly secure, designed for high reliability, and should be easy to maintain and service.

As an enterprise vendor with a proven track record, Sun is in a unique position to address these challenges. With more than two decades of focus on network computing and a history of solving complex customer problems related to enterprise computing, Sun has developed deep expertise in data center best practices and system architectures. Sun uses this expertise to combine its industry-leading hardware components with enterprise software such as Sun Java Enterprise System and the Solaris™ Operating System. Sun's global service and support organization with hundreds of man-years of experience in enterprise computing adds even more depth to Sun's offering. This strong combination of skills and technologies is now being brought to the x86 server market to help customers build high quality solutions that are cost-effective to architect, implement, and manage.

Sun is committed to being a leader in the x64 (64-bit x86) server market and has formed a new product group that is focused on designing innovative platforms based on industry-standard architectures. The Sun Fire™ X4000 server line emanates from this new organization within Sun and is designed to provide greater flexibility to customers by running Linux and Windows operating systems in addition to the Solaris Operating System. By combining Sun's network computing expertise with the performance per watt advantages of the AMD Opteron™ processor, Sun has created a strong product offering, which brings blazing performance and a new level of energy efficiency to the x86 server market.

Hector Ruiz, Chairman, President and CEO of AMD, echoed his endorsement of Sun's focus on this market by saying,

"Real innovation for the enterprise requires real engineering talent, and few companies understand this better than Sun."

Optimizing Enterprise Mission-Critical Computing

Sun is bringing its expertise in enterprise mission-critical computing to the x86 server market by launching a new line of x64 servers and a complete systems approach that goes beyond the server itself to include integrated solutions for the enterprise and a unique business model that enables customers to purchasing computing resources in a new way.

Fast, Reliable, and Efficient Servers Are the Foundation of Sun's Offering

The Sun Fire X4100 and X4200 servers (Figure 1) are the fastest, most energy-efficient, and most reliable one-way to four-way servers in their class. These servers run virtually any operating system including Solaris OS, Linux, and Windows — all supported by Sun. They are designed to deliver increased service levels while also offering lower operational costs and better asset utilization. The product line includes two categories of rack servers to address the needs for two separate situations.

This new industry-standard x64 server family begins with the Sun Fire X2100 server, the lowest cost single-socket x64 rack-mount server, and includes the 2-socket, 4-way Sun Fire X4100 and Sun Fire X4200 servers. Future servers in this same family are being designed to accommodate up to 8 dual-core processors to achieve 16-way mid-range system performance levels, offering customers the ability to standardize x64 servers across their entire IT infrastructure.

The Sun Fire X2100 server is designed for low cost deployment in environments that do not require redundant components within the server. These servers are useful and cost-effective in situations where redundancy is handled at the software or application level. The Sun Fire X4100 and X4200 servers include built-in redundancy and all of the necessary features to support reliability in the enterprise. Industry-standard benchmarks show that these servers offer 1.5 times the performance of competitive servers and have proven to be the industry's fastest 1U/2-socket rack servers¹.

The combination of reliability and performance throughput makes this new server family ideal for both application servers and database servers. With high energy efficiency and a small footprint, they are also a great fit for server consolidation projects.

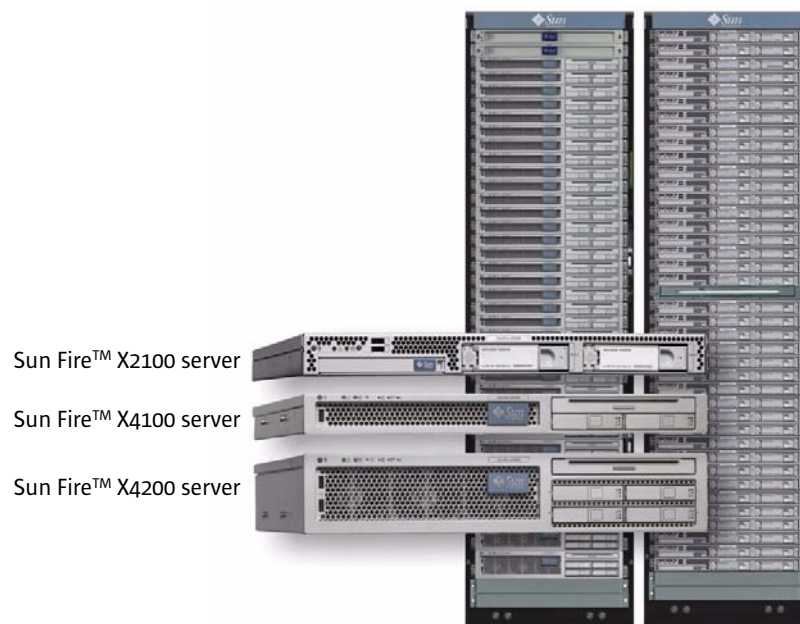


Figure 1. The Sun Fire x64 server product line brings enterprise computing to x86 environments.

Sun had three primary design goals for this new line of servers:

- **Fastest system** — Sun Fire x64 servers combine the high performance of the 64-bit AMD Opteron processor with large memory capacity and high-bandwidth, low-latency interconnects for compute clusters. The result is an x86 compatible system that can stand-alone as a high performance compute server, or can be easily integrated into a network of high performance processors to share application workloads and process extremely large jobs.
- **Reliability** — By using common components, a consistent architecture all the way up to 16 cores in future Sun Fire x64 servers, and adhering to industry standards, Sun has designed a new server line that is not only highly reliable, but also easy to maintain and service. The extremely reliable Solaris 10 OS has been proven to scale well on 64-bit multi-core systems and offers binary compatibility so that applications can run unchanged across any of the Sun Fire x64 servers. This allows businesses to add compute capacity without changing the software environment, helping to maintain application stability.

¹For details on the Sun Fire X4100 performance, visit: sun.com/x4100/benchmarks.html. For details on the Sun Fire X4200 performance, visit sun.com/x4200/benchmarks.html.

- *Operational efficiency* — There are three primary ways that the Sun Fire x64 server line can help improve operational efficiency. The first is the efficient use of power in the AMD Opteron processor. This feature enables Sun Fire x64 servers to deliver greater performance while consuming up to 56 percent less power and generating less heat than comparable Intel Xeon multiprocessor systems. This means that it is less expensive to provide power and cooling for Sun Fire x64 servers. The second means of enhancing operational efficiency is through the ease of service for Sun Fire x64 servers and the highly efficient management environment that includes an intuitive user interface for managing and monitoring groups of server resources. The third support for operational efficiency is the systems approach Sun has taken with Sun Fire X4000 servers and the Sun Grid Rack System. Sun Fire X4000 servers are designed for aggregation into a distributed architecture and can provide even greater efficiencies when deployed within the Sun Grid Rack System. An entire Sun Grid Rack system can be deployed and managed as a single component, leveraging the network computing and solution expertise of Sun and its partners, and enabling IT staff to provision and manage IT applications in less time.

Smarter Building Blocks — Pods

The complexity of today's IT infrastructure is driving IT managers to look for modular solutions that can be deployed quickly and managed as a composite system rather than as a set of individual components. Sun is revolutionizing the economics of distributed computing by defining and optimizing higher level building blocks which Sun calls Pods.

A Pod is a standardized unit that is optimized for a specific business service and is designed to greatly simplify the task of deploying, managing, and expanding computing resources within the data center. A Pod generally contains a collection of servers, storage, and networking components as well as infrastructure software. The aggregated components are designed to work together in an optimized way and to be easily deployed in an existing IT infrastructure (Figure 2).

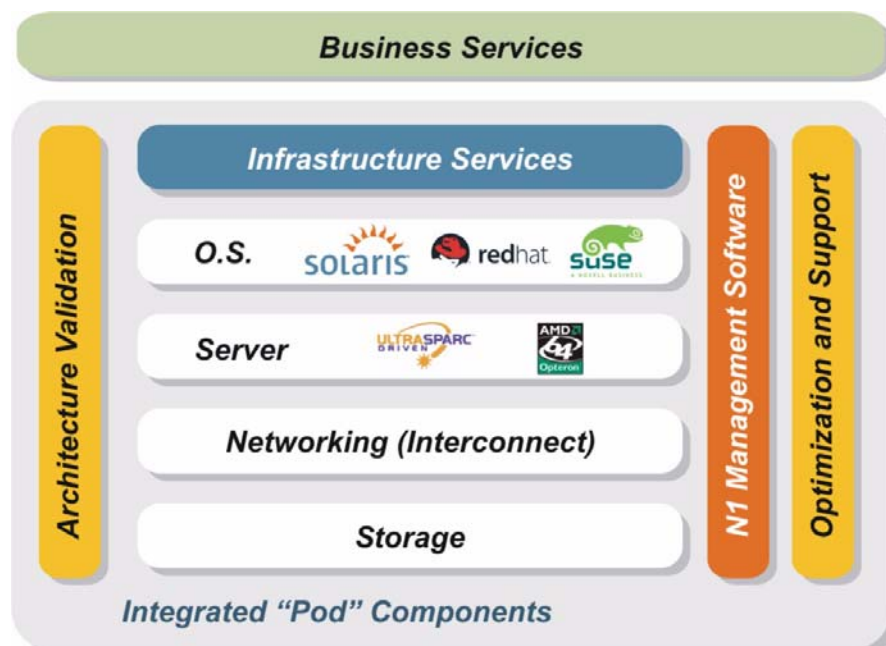


Figure 2. Sun's Pod approach aggregates multiple components into a repeatable solution.

The Pod becomes the unit by which the customer grows and manages its data center, addressing the need for an agile infrastructure that can take advantage of the economies of scale with a standardized, yet optimized, architecture. Capacity is added one Pod at a time.

The Sun Grid Rack System is an example of the Pod concept. It is an integrated factory-configured cluster that has been tailored to a specific solution area. The first two Sun Grid Rack System offerings address the High Performance Computing (HPC) and Web Services environments. These factory-assembled and pre-tested solutions integrate Sun Fire x64 servers with networking, storage, and software to create a complete system that is fully supported by Sun. Their architectures are derived from Sun's enterprise-class engineering disciplines and Sun's real world experience with thousands of Grid deployments. Systems are offered in a range of flexible configurations with an open architecture supporting industry standards to simplify deployment into a customer's unique environment.

Sun Client Solutions can also help customers architect a Pod that is optimized for a customer-specific business problem. The Pod is designed as a repeatable solution that can be delivered with or without Sun's services and expertise and uses Sun Grid Rack Systems as standardized building blocks.

Sun's smarter building-block approach can provide better economics through agile deployment, higher quality, lower risk, flexible architecture, higher utilization, and easier management.

Enabling Agile Deployment

Customers can experience up to 90% faster deployment, and up to 80% less installation issues when deploying Sun Grid Rack systems instead of individual servers. Thorough testing and integration is done at the factory, not on the customer's data center floor. The SunSM Customer Ready Systems program (CRS) is used to stage each system, perform system testing to check all hardware components, and optionally pre-load software to provide a full functioning solution that is ready to power on when it arrives at the customer's dock.

In addition to the time saving features of Sun Grid Rack Systems, Sun Fire x64 servers offer features that can help accelerate deployment and simplify operation. Uniformity in the Sun Fire x64 server product line allows for simplification of administration procedures and faster implementation of system updates or upgrades. Sun also provides proven and tested infrastructure solutions as well as technical best practices that are documented in Sun BluePrintsTM. These proven approaches to well-defined problems can provide further support for rapid deployment and flexibility in IT services.

Accelerating Deployment with Sun Services

Sun offers a comprehensive portfolio of consulting services and workshops that leverage Sun's vast experience with network computing to help design, implement, and manage optimal solutions, helping organizations to realize the full value of their IT investments. Sun Services gets solutions up and running quickly and efficiently, and provides the operational support and management capabilities that help maximize service levels while minimizing costs. Sun also offers Sun Managed Services where management of the customers IT infrastructure or applications is performed by Sun and its partners. Sun Managed Services are designed to work together with the customer's own IT resources and with third party service organizations, enabling customers to focus on their core business while maintaining control of the IT environment.

Reducing the Cost of IT Operations

The high cost of operating and managing a large number of servers has become one of the most painful issues facing IT managers today. Sun Fire x64 servers offer good news in this area by providing significant cost savings in power consumption and cooling, as well as more efficient management and servicing. In addition to the cost saving Sun Fire x64 server features discussed below, Sun provides a broad array of time-saving management tools ranging from Sun storage software for monitoring and managing storage resources to Sun™ Management Center software for managing all system elements within the Sun environment

Dramatic Savings on Cooling and Power Costs

Customers can save more than \$0.5M in power and HVAC costs when deploying a compute farm of 1000 CPUs consisting of Sun Fire X4100 servers with Dual-Core AMD Opteron processors as compared to other servers based on the Intel Xeon processor. Sun Fire X4100 servers offer up to 56 percent savings in power and cooling². The power efficiency in AMD Opteron processor results in more transactions per watt of power used, leading to reduced cooling costs as well. Sun Fire X4000 servers have also been engineered to increase air flow so that they are as efficient as possible to cool.

Simplified System Management Without the Extra Costs

Experience has shown that the management environment is a critical factor in the total cost of ownership of servers. Sun believes that it is so important that Sun designed the management architecture for its Sun Fire X4000 servers first, and then built the server around the management environment. Sun Fire X4000 servers include a sophisticated service processor, Sun Integrated Lights Out Manager (ILOM), which monitors the server hardware and software for faults, and interacts with remote management software to enable zero touch remote management.

Lights out management enables out-of-band communication with the server even if the OS is not running. By connecting to the ILOM board using the JavaRconsole, a Java™ WebStart application, an administrator can choose to redirect his own local keyboard, mouse, floppy and/or CD/DVD-ROM drive as if connected to the remote server. The remote keyboard, mouse, floppy and CD/DVD are then emulated by the ILOM Service Processor and seen by the BIOS and OS as if they were locally connected to the Sun Fire X4000 server. Remote Video also allows the administrator to see anything that comes out of the server graphic chip in the remote JavaRconsole window. These tools allow the administrator to install an operating system, patches, or applications, configure or manage services, and enter data as if he or she were working locally at the server. In short, any service operation that does not require physical insertion or removal of parts can be done from another city or continent.

ILOM implements the latest in management standards including Intelligent Platform Management Interface 2.0 (IPMI 2.0), Simple Network Management Protocol (SNMP), and the Systems Management Architecture for Server Hardware (SMASH) CLI initiative. Support for these industry standards and initiatives makes it easier for enterprises to deploy and manage Sun Fire X4000 servers within their existing IT infrastructure. And because the ILOM operates independently of the operating system, all of the features of the ILOM are available regardless of the customer's choice of operating system.

2. One Rack of Sun Fire X4100 Servers populated with AMD Dual-Core Processors can take as much as 56 percent less power on average than the Intel Xeon MP processor based solution required to provide a similar amount of CPU cores.

All communications with ILOM are protected using security standards such as Secure Socket Shell (SSH). ILOM also helps prevent unauthorized access through Role-Based Access Control (RBAC) and single sign-on that is supported through Lightweight Directory Access Protocol (LDAP).

Sun X4000 servers come pre-installed with ILOM at *no extra cost* whereas similar features on competitive servers can cost more than U.S. \$300 per system³.

Sun N1 System Manager Software

The combination of ILOM with Sun N1 System Manager software enables a system administrator to manage hundreds of servers as if they were a single system. Designed specifically to address the problems associated with managing server infrastructure, N1 System Manager helps customers provision, monitor, patch, and manage Sun Fire x64 servers. Sun N1 System Manager can help reduce IT support costs and improve service levels by providing efficient methods for managing a pool of server resources.

Sun N1 System Manager software provides remote management of servers through a Web-based graphical user interface (GUI) or from a command line interface (CLI). The GUI includes guided forms and templates for complex commands as well as drag and drop features for managing OS profiles, patches, and firmware updates to systems or groups of systems. Remote management capabilities include bare metal provisioning, system-level configuration, and management and monitoring functionality.

Sun's experience with customers shows that an average 20 percent of a system administrator's time is spent on initial deployment of new servers. Using N1 System Manager customers can significantly reduce initial deployment time through automated discovery which automatically captures the hardware environment information, allowing administrators to deploy and begin monitoring new systems within minutes. Updates and maintenance tasks are also more efficient. By using the grouping features in N1 System Manager, administrators can perform operations such as patch updates on entire groups of like servers simultaneously. This feature also helps administrators to rapidly provision new OS payloads (Solaris OS or Red Hat Linux) or complete software stacks from a central console. Industry standard interfaces also make it easy to blend Sun N1 System Manager with an existing enterprise management solution.

Simplified Serviceability

Sun Fire x64 servers are designed for easy serviceability with hot-plug components and easy access to common service areas. For example, system fans are easy to reach and can be replaced without having to pull the entire server out of its rack.

Sun Fire x4000 servers are also equipped with service lights that integrated with the ILOM environment to help system administrators and service engineers work together to quickly identify systems faulty components in need of service. When working on a full rack of servers, it can be difficult to identify which server needs attention even if the fault was already identified on a remote management console. The ILOM environment on Sun Fire X4000 servers allows the administrator to manipulate front panel lights, so that a blinking light can make it easier to find the server that corresponds to fault identified using the system management tools. Once inside the server chassis, additional lights help pinpoint the faulty component quickly for faster service.

³.List prices for similar functionality on other platforms include HP Advanced iLO at US \$349, IBM RSA II at £399, and Dell Remote Access Card at US \$299 per system.

Serviceability is also enhanced through the predictive self healing and fault management facilities of the Solaris 10 OS which are integrated with ILOM environment of Sun Fire X4000 servers. If a faulty system component is diagnosed and configured out of the system by the Solaris Fault Manager, ILOM enables administrators to remotely address the fault in a timely manner so that system performance and service levels can be maintained.

Choice of OS

Businesses have begun to standardize on OS and server hardware architectures to help reduce management costs. Sun provides a more options for its Sun Fire X4000 and X2000 servers so that they can be easily integrated into an existing IT environment and can be maintained and managed using existing tools. These servers come pre-loaded with the industry-leading Solaris 10 OS at no cost, and also run virtually any OS with full support from Sun for both Red Hat Enterprise Linux and Microsoft Windows Server 2003. Sun Fire X4000 and X2000 servers are also Windows Catalog Certified for Microsoft Windows Server 2003. Organizations can therefore take advantage of the excellent price performance and manageability of Sun's new servers while maintaining a consistent OS environment across their IT infrastructure for higher efficiency in IT operations.

Enabling Greater Return on IT Assets

Assets which can generate a lot of value to the business and are cost-effective to own and operate offer the greatest financial return. Sun has therefore designed its new Sun Fire x64 servers not only to be cost-effective, but also to offer greater value to businesses.

There are three primary factors affecting the business value that a hardware server can generate:

- *Investment Protection* — Protecting investments requires that assets have a long and useful lifespan even as business needs grow and change over time. Hardware servers that can be easily and cost-effectively scaled to meet changing business needs can offer greater value versus servers which require a major transition in order to add capacity. Likewise, servers that can be easily repurposed for other usages also provide investment protection and greater return.
- *System Utilization* — A server that can be fully utilized can generate more results (e.g. more transactions per hour) and thus brings more value to the business.
- *Performance* — Getting more work done by doing it faster also makes a server more valuable to the business.

Protecting Investments

Sun provides customers with the flexibility to build a server infrastructure that can scale from low-end to high-end systems, helping them to protect existing investments in hardware, software and training. By offering seamless migration of 32-bit applications to the 64-bit environment and source code compatibility between architectures, Sun also helps protect investments in pre-existing software applications.

Unlike other x86 servers which are often constrained to scale up to four or eight CPUs, future Sun Fire x64 servers will scale seamlessly all the way up to 16 cores to achieve mid-range system performance levels with the same consistent architecture. The Solaris OS is also a proven 64-bit OS that has demonstrated extreme scalability for large multi-core systems.

The use of industry standards and open interfaces across the product line also helps customers avoid vendor lock-in. Software applications that run on Sun Fire x64 servers and follow these industry standards can be easily integrated with other applications and are also well poised to run on other vendors' platforms now and in the future.

Driving Greater System Utilization

Sun management tools provide the means to drive greater system utilization through virtualization of server resources and through scheduling software that distributes workloads across a pool of server resources. Solaris Containers in the Solaris OS provide flexible, software-defined boundaries for isolating software applications or services. Applications can then be managed independently of each other, even while running in the same instance of the Solaris OS.

With the management environment that comes with Sun Fire x64 servers, system administrators can also easily provision new servers using Solaris Flash technology. Solaris Flash software allows an administrator to archive a copy of a complete software stack and later replicate the archived image onto other servers. This enables existing servers or new servers to be up and running with a complete software stack in just minutes.

For customers who wish to further increase the utilization of their servers and streamline IT operations by virtualizing server resources, Sun offers both Solaris Containers and the VMware line of products. VMware ESX Server is virtual infrastructure software for partitioning, consolidating and managing systems in mission-critical environments. With VMware ESX Server on Sun Fire x64 servers and support for the Solaris OS, IT organizations can easily provision new services running on the Solaris 10 OS, Windows and standard Linux distribution operating systems on the same piece of hardware. Partitioning servers to run multiple operating systems enables a greater variety of applications to be run on the same server and therefore helps organizations more fully utilize their IT assets.

Sun also offers a resource scheduling solution called Sun N1™ Grid Engine software which enables pooling of server and storage resources into larger enterprise grids where multiple users, teams, and departments can share common resources while working on different projects. Computing tasks or jobs are distributed across the grid in accordance with resource requirements for the job, user requests, and managerial policies. Accounting data is also stored to make it easy to monitor and manager resource usage by specific jobs, users, or departments. The low overhead of Sun N1 Grid Engine software and its focus on scheduling workloads to optimize resources has enabled some customers to reach an overall resource utilization of up to 90 percent using Sun N1 Grid Engine software.

Simply Fast

The Sun Fire X4000 servers have proven to be the industry's fastest, 1U/2-socket rack servers with throughput performance that is 1.5 times the performance of competitive servers that use Intel Xeon processors. Since each server can handle 1.5 times the workload of competitive server, the same overall workload can be processed with 33 percent fewer servers in the infrastructure.

On a variety of workloads ranging from numerically intensive calculations to application intensive business processing tasks such as server-side Java, the Sun Fire x4000 servers have reached new high ground, outdoing the competition by as much as 50 percent on SPECfp_rate2000 benchmark (Figure 3)⁴.

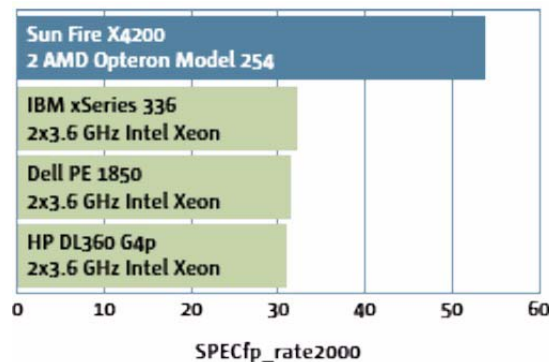


Figure 3. The Sun Fire X4200 server outperformed competitive servers on the SPECfp_rate2000 benchmark.

Delivering Enterprise Reliability and Security

Designed for reliability and serviceability, Sun Fire x64 servers are built from common components with fewer interconnections and include built-in redundancy, enterprise RAS features, and easy access to components for servicing. Sun offers best-in-class reliability for mean time between system interruptions (MTBSI), service intervals, and fault robustness on x86/x64 servers.

The highly secure Solaris 10 OS also provides a host of security features previously only found in Sun's military-grade Trusted Solaris OS. User and Process Rights Management work in conjunction with Solaris Containers to enable secure hosting of thousands of applications and multiple customers on the same system. Security administrators can also minimize and harden Solaris to implement a secure foundation for deploying enterprise services.

The security and availability of Sun Fire x64 servers can be further enhanced when deployed within Sun Grid Rack Systems where all components have been proven to work together. Sun Grid Rack Systems can take advantage of the Sun Secure Application Switch - N1000 Series which integrates Gigabit wire-speed application switching, chip-level embedded security, and dynamic resource virtualization. The integrated services within the Sun Secure Application Switch help to greatly simplify management of distributed computing environments by eliminating and consolidating specialized components such as legacy server load balancers, SSL accelerators, and bandwidth management appliances. The resulting simplicity reduces the risk of errors, thereby enhancing reliability and improving security.

Another major factor that sets Sun Fire x64 servers apart from competitive offerings is their service and support. Whether running Solaris, Linux, or the Microsoft Windows operating system, Sun Fire x64 servers are supported by Sun's comprehensive support services. Experienced Sun engineers are available to identify and resolve technical issues around the clock. Sun also offers online self-help and monitoring tools as well as SunSM Connection, an always-available and highly secure connection that delivers service and support as a network service. Pre-emptive support offerings from Sun can help maximize service levels and deliver greater reliability for enterprise applications.

4. The comparison is based on SPECfp_rate2000 benchmark results as of 08/30/05. The Sun Fire X4100 server (2x AMD Opteron processor Model 280, 4 core, 2 chip, 2 core/chip, 16 GB DDR1, 72GB disk, Solaris 10): SPECfp_rate2000 - 79.1. The Dell PowerEdge 6850 (4x Intel Xeon 3.33GHz, 4 core, 4 chip, 1 core/chip, 1MB L2, 8MB L3, 16GB DDR2, 36GB disk, MS Windows): SPECfp_rate2000 - 52.5. Prices as tested: Sun Fire x4100 - \$14,825; Dell PE6850 - \$33,624. Prices as of 8/22/05 using Dell Enterprise price list. Sun results have been submitted to SPEC. For the latest benchmark results, visit <http://www.spec.org>.

Summary and Conclusion

Organizations are striving to align IT services with business goals and to use their IT services to gain competitive advantage. When deploying x64 servers in the data center, they are expecting not only excellent value, but also the kind of reliability, security, and agility needed for an enterprise-class IT infrastructure. IT spending reflects these priorities as businesses are looking at many aspects of return on investment and are standardizing on common tools and technologies in their IT infrastructure to gain economies of scale.

With many years of enterprise network computing expertise, Sun is bringing a new class of x64 server to the market. Sun Fire x64 servers are designed from the ground up by Sun to deliver blazing performance and are delivered within an enterprise solution context. Sun's offering has the following major advantages:

- *Industry-leading performance* — The fastest x64 servers on the market help deliver greater return on IT assets.
- *Operational efficiency* — Lower power and cooling costs coupled with more efficient management and serviceability give businesses a chance to redirect more of their IT budget to strategic projects.
- *Enterprise reliability and security* — Enterprise-class RAS (Reliability, Availability, and Serviceability) features in Sun Fire x64 servers, built-in remote management tools, an industry leading secure OS, integrated offerings with Sun Grid Rack Systems, and Sun's world class service and support organization bring a new level of enterprise reliability and security to x64 computing.
- *Solution orientation* — Sun has gone beyond designing a high performance server and is providing comprehensive solutions that can help accelerate deployment and reduce risk.

For more information on the new Sun Fire x64 server product line and why it is a smarter choice for your enterprise, contact a Sun sales representative or visit the Web sites listed in Table 1 below.

Table 1. Web sites for additional information

Web Site URL	Description
www.sun.com/servers	Sun Server Product Line
www.sun.com/software/solaris	Solaris 10 Operating System
www.sun.com/amd/	Sun x64 Product Offerings
www.sun.com/service/about/	Sun Services Overview
www.sun.com/products/networking/switches/n2000/	Sun Secure Application Switch - N2000 Series
www.sun.com/storage/	Sun Storage Solutions
www.sun.com/solutions/blueprints	Sun BluePrints Program
www.sun.com/products/architectures-platforms/refarch/	Sun Reference Architectures

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